

Project Title

"Design and Implementation of a Traffic Light Controller Using Sequential Circuits"

Objective

Design a traffic light controller for a four-way intersection using sequential circuits to manage the flow of vehicles effectively.

Description

1. Introduction

- The project aims to create a traffic light system that cycles through states for different directions (e.g., North-South and East-West) with appropriate timing for red, yellow, and green lights.
 - The system will be fully automated and controlled by a finite state machine (FSM).
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2. Main Steps

a. Functional Analysis

- Define the traffic light sequence:
 1. **State 1:** North-South green, East-West red.
 2. **State 2:** North-South yellow, East-West red.
 3. **State 3:** North-South red, East-West green.
 4. **State 4:** North-South red, East-West yellow.
- Each state lasts for a specified duration.

b. Component Selection

- **Clock:** Generate a base timing signal (e.g., 1 Hz).
- **Counters:** Control the timing for each light state.
- **Flip-Flops:** Implement the FSM states.
- **Decoders:** Drive LEDs for red, yellow, and green lights.
- **Logic Gates:** Manage state transitions.

c. Circuit Design

- Design the FSM with:
 - A state diagram for the traffic light sequence.
 - State encoding (binary or Gray code).
- Build the circuit:
 - Use a clock divider to generate appropriate timing for state transitions.

- Connect outputs to LEDs representing the lights.
- Draw the schematic.

d. Simulation

- You can use **Logisim** simulator tool to draw and check the behaviour of the proposed circuit